

**Office Memorandum • ILLINOIS STATE WATER SURVEY**

TO: Jim Gibb

DATE: August 19, 1982

FROM: Tom Naymik

SUBJECT: Statement to Attorney General's Office RE: Monsanto landfill  
at Sauget

After reviewing the "Subsurface Investigation, Sanitary Landfill, W.G. Krummrich Plant, Monsanto Company, Sauget, Illinois" by D'Appolonia, I concluded the probability of leaching of the fill material and direct transport toward the Mississippi River is extremely high. I feel this statement is valid even in the presence of a very serious error in D'Appolonia's study i.e., not leveling in the elevations of the piezometers. Three primary geohydrological conditions at the Sauget site support my conclusion:

1) The average hydraulic conductivity (K) of the sands below the fill material is high (approximately  $10^{-4}$  cm/sec). Remember however, K is not only a coefficient of the medium, but also of the fluid. The K values in D'Appolonia's report assume the fluid being transported is groundwater which is normally assumed to have a density of  $1.0 \text{ g/cm}^3$  and a dynamic viscosity of 1.124 centipoises at  $15.5^\circ\text{C}$ . Benzene, for example, has a dynamic viscosity of 0.705 centipoises at  $15.5^\circ\text{C}$  which in itself could raise the hydraulic conductivity by as much as 37%.

2) The hydraulic head at the site decreases with depth (in general). This means there is a potential for vertical downward movement well into the groundwater flow system. Even though the piezometers were not leveled-in, nested piezometers showed head differences of as much as approximately 18 ft. indicative of downward migration.

3) Horizontal groundwater movement is toward the Mississippi River. This is not clearly shown in the report mainly because head differences are small and cannot be detected without a level. At times (when the river stage is high) flow will be temporarily away from the river. Also, normal flow toward the river will be disturbed by operating production wells. These two exceptions are not addressed in the report. Groundwater flow toward rivers, however, is an accepted universal law of groundwater science.

cc: Mike Barcelona ✓

## REFERENCES

### IEPA Reports (Dates represent the date of sample collection)

Sauget Toxic Dump (Recrystallization and Spent Caustic Ponds, Wells and Ranney Well)

1/17/73      Lab Report Nos. A103685-689  
4/73          Lab Report No. A105365  
10/28/75     Lab Report Nos. 7731-34  
2/17/76      Lab Report Nos. A140071-76

Sauget Toxic Dump (D'Appolonia Wells)

10/12/79     Lab Report Nos. D015283-288  
                 Lab Report Nos. A08424-29  
                 Lab Report Nos. D020300-309

Sauget Toxic Dump (Seeps and Soil Samples)

10/2/81      Lab Report Nos. D022687-92

### D'Appolonia Consulting Engineers, Inc.

4/2/80 (received at IEPA) "Subsurface Investigation of Sanitary Landfill Site at W. G. Krummrich Plant," Monsanto Company, Sauget, IL

### USEPA Region V

4/30/82 Memo from: Milt Clark, Environmental and Human Health Specialist  
to: Sandra Gardebring, Acting Enforcement Counsel

J. M. Davidson, P. S. C. Rao, L. T. Ou, W. B. Wheeler and D. F. Rothwell.  
1980. Adsorption, Movement and Biological Degradation of Large Concentrations of Selected Pesticides in Soils. EPA-600/2-80-124.

USEPA. 1970. Water Quality Criteria Data Book, Vol. 1, Organic Chemical Pollution of Freshwater. U. S. Environmental Protection Agency Water Quality Office. Prepared by A. D. Little, Inc., Cambridge, MA, December 1970. Water Pollution Control Research Series 1801ODPV12/70, 379 pp.

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TABLE 1

Properties of compounds identified in water samples from the Krummrich Landfill Site at concentrations greater than 500  $\mu\text{g}\cdot\text{L}^{-1}$

Seeps and Groundwater Samples

<u>Compound</u>	<u>Toxic Properties†</u>
Chloronitrobenzene	High toxic hazard by acute (or chronic) ingestion or inhalation; Poisonous effects by blood and pulmonary routes are cumulative.
Chlorobenzene	Moderate toxic hazard by acute (or chronic) ingestion or inhalation. Effects of subnarcotic doses on humans is meager, though prolonged exposure may lead to kidney or liver damage.
Chlorophenol	High toxic hazard by acute (or chronic) ingestion, inhalation or skin absorption.
Dichlorobenzene	Slight to moderate toxic hazard by all routes. o-isomer probably more toxic than m- and p-forms, however have been used as insecticides; are irritating to skin and membrane tissues. Has been reported to cause liver and kidney injury.
Dichlorophenol	Similar to chlorophenol; Details of toxicity unknown.
<u>Seeps</u>	
Chloroaniline	High toxic hazard by acute (or chronic) ingestion, inhalation or skin absorption.
2,4-D (2,4-Dichlorophenoxyacetic Acid)	Moderate toxic hazard by acute or chronic ingestion. Liver and kidney damage have been reported experimentally.

† From Sax, N. I. (1973) Dangerous Properties of Industrial Materials, 3rd Edition. Van Nostrand Reinhold Co., 1251 pp. (degree of hazard rating outlined below)

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- High - May cause death or permanent injury after very short exposure to small quantities.
- Moderate - May involve both irreversible and reversible changes; not severe enough to cause death or permanent injury.
- Slight - Causes readily reversible changes which disappear after end of exposure.

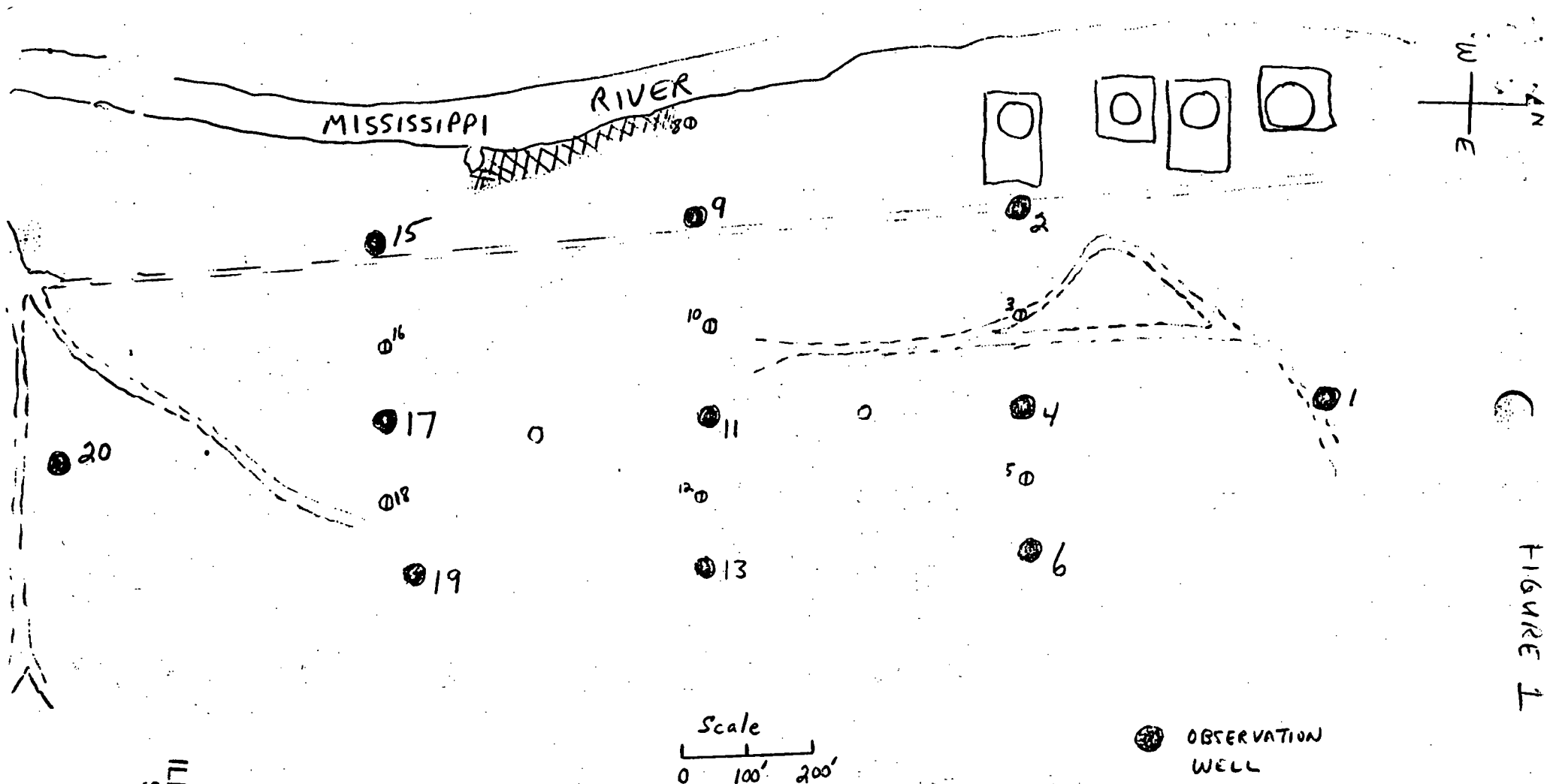





FIGURE 1

-  OBSERVATION WELL
-  BORING LOCATION
-  AREA AFFECTED BY SEEPS

Scale  
0 100' 200'

W.G. Krummrich Landfill Site

*MB 9/9/82*

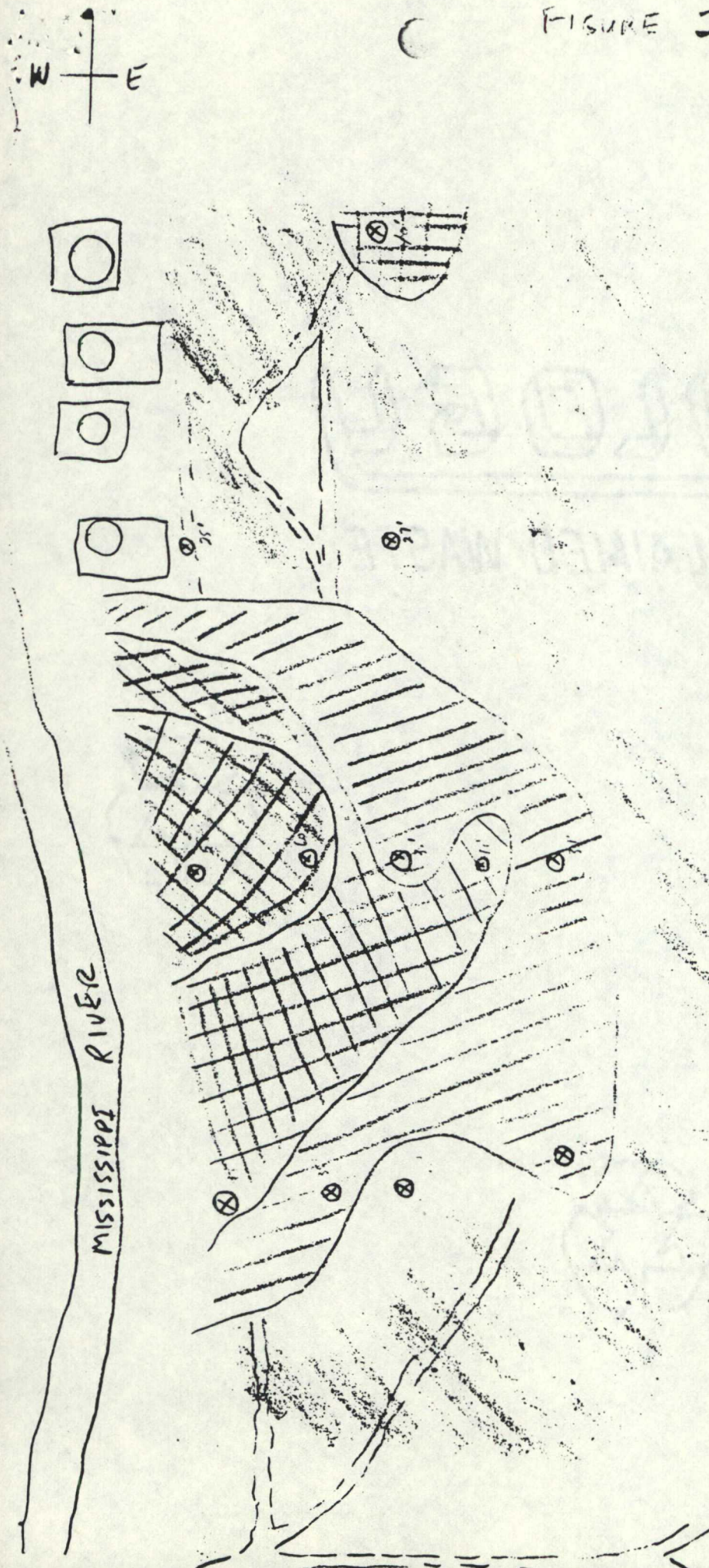
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FIGURE 2



MAXIMUM DEPTH OF LEACHATE DETECTION IN SOIL BORINGS*	50-60'	40-50'	30-40'	0-30'
(1977)				

W.G. Krummich Landfill Site

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\* D'Appolonia Consulting Engineers

11/15/82